MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

PSM0325 – INTRODUCTION TO PROBABILITY AND STATISTICS

(Foundation in Information Technology / Life Sciences)

16 October 2015
3.00 p.m. – 5.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of FOUR **printed** pages including the cover page.
2. Answer **FOUR** out of **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. **Statistical table** is provided.

Question 1 (25 marks)

a. A survey conducted among the employees of a company revealed the following data regarding the gender and the highest education level of the employees:

Gender	Highest Education Level		
	Primary	Secondary	Tertiary
Male	20	90	15
Female	35	72	13

If an employee is selected at random, what is the probability of selecting

i. a female employee? (2 marks)

ii. a female employee or an employee with only secondary level education? (3 marks)

iii. a female employee given that she has a tertiary level education? (4 marks)

b. A committee is chosen from a group of ten men and eight women.

i. How many ways can a committee of five men and four women be formed? (3 marks)

ii. How many ways can a five-member committee be formed if the committee must have at least 3 men and 1 woman? (5 marks)

c. In a fast-food outlet, all the orders are divided equally among three teams – Team A, Team B, and Team C. From past experience, it is found that Team A is able to deliver the orders on time for 90% of the orders they received, Team B for 85% of the orders they received, and Team C for 80% of the orders they received.

i. What is the probability that an order was not delivered on time? (3 marks)

ii. What is the probability that an order that was delivered on time was delivered by Team C? (5 marks)

Continued ...

Question 2 (25 marks)

a. The probability function of a discrete random variable X is given by:

x	1	2	3	4
$p(x)$	$2k$	0.32	0.38	k

i. The mean of X is 2.38. Find the value of constant k. (5 marks)

ii. Find the probability that X is at least 2. (2 marks)

iii. Find the variance of X. (7 marks)

b. The time taken (in hours) by a student to complete a test has a probability density function as given below:

$$f(x)=\begin{cases}\frac{2}{11}(x+3); & 2<x<3\\ 0; & \textit{otherwise}\end{cases}$$

i. Find the probability that the time taken by a student to complete the test is at most 2.5 hours. (5 marks)

ii. Calculate the expected value of the time taken to complete the test. (6 marks)

Question 3 (25 marks)

a. The duration of an international flight is normally distributed with a mean of 4 hours and a standard deviation of 20 minutes. Find the probability that a randomly selected international flight

i. will take less than 3.7 hours. (5 marks)

ii. will take at least 4.5 hours. (5 marks)

b. The average number of customers of a local restaurant is 6 customers per hour. Find the probability that the restaurant

i. will have less than 10 customers per hour. (3 marks)

ii. will have 10 to 15 customers in a 2-hour period. (5 marks)

c. In a Statistics test, past data showed that 80% of the students will pass the test. In a sample of 15 students, find the probability that

i. more than 10 students will pass the test. (3 marks)

ii. more than 6 students will fail the test. (4 marks)

Continued ...

Question 4 (25 marks)

a. The results of all the 6 participants in a preliminary test are given:

36 47 36 21 28 40

List all the possible samples of size four from this data and construct a sampling distribution of the sample mean. (10 marks)

b. The mean height of the students in a private school was 162cm with a standard deviation of 18cm. Find the probability that the mean height of a random sample of 100 students is:

i. between 160cm and 165cm. (7 marks)

ii. within 5cm of the population mean. (8 marks)

Question 5 (25 marks)

A restaurant owner claims that the mean number of customers who eats in his restaurant is at least 50 per day. To test the claim, the number of customers who eats in the restaurant was observed for 40 days. The observation from the 40 days found that the mean number of customers is 47 per day with a standard deviation of 7.

a. Based on the results of the 40-day observation, construct a 95% confidence interval and a 99% confidence interval for the mean number of customers who eats in the restaurant per day. (11 marks)

b. State two methods to increase the width of a confidence interval. Which method is a better alternative? (3 marks)

c. At the 0.01 level of significance, is there evidence to support the restaurant owner's claim? (11 marks)

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